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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/675,975	09/29/2000	Gregory Henry	042390.P8940	1733

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EXAMINER

NAHAR, QAMRUN

ART UNIT	PAPER NUMBER
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2124

DATE MAILED: 02/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/675,975

Applicant(s)

HENRY, GREGORY

Examiner

Qamrun Nahar

Art Unit

2124

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 November 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-10,13-20,22,23 and 25-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 4-10, 13-20, 22-23 and 25-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is in response to the amendment filed on 11/11/04.
2. The objection to claim 20 is withdrawn in view of applicant's amendment.
3. The rejection under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention to claims 20, 22-23 and 25-30 is withdrawn in view of applicant's amendment.
4. Claims 1, 10 and 20 have been amended.
5. Claims 1, 4-10, 13-20, 22-23 and 25-30 are pending.
6. Claims 10 and 13-19 stand finally rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
7. Claims 1, 4-10, 13-20, 22-23 and 25-30 stand finally rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi (U.S. 5,396,631) in view of Buzbee (U.S. 5,815,720), and further in view of Granston (U.S. 5,966,538).

Response to Amendment

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
9. Claims 10 and 13-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 10 recites the limitation "measuring the characteristic" in line 19 of the claim. There is insufficient antecedent basis for this limitation in the claim. Therefore, this limitation is interpreted as "measuring a characteristic"

Claims 13-19 are rejected for dependency upon rejected base claim 10 above.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1, 4-10, 13-20, 22-23 and 25-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi (U.S. 5,396,631) in view of Buzbee (U.S. 5,815,720), and further in view of Granston (U.S. 5,966,538).

Per Claim 1 (Amended):

Hayashi teaches a method of compiling a source language routine ("An object of the present invention is to provide a compiling apparatus and a compiling method that meet a variety of requirements for optimization. A compiler according to the present invention provides a high-performance object code, according to a target architecture, a source program, and optimization requirements." in column 3, lines 6-14); generating an intermediate language routine from the source language routine provided by a user ("In Fig. 2, the front end 2 changes the source program 1 into the intermediate representations." in column 5, lines 48-49); performing an

Art Unit: 2124

optimizing change to the intermediate language routine that results in an altered intermediate language routine; and generating a machine language routine from the altered intermediate language routine ("In Fig. 3, step S1 picks up optimization functions to be held in a compiler. The optimization data 22 includes a list of optimization functions corresponding to the front-end intermediate representation data 20 and code providing intermediate representation data 21, and the step S1 selects some of the optimization functions from the data 22, so that they are executed by the optimizing compiler. This selection may be made by a person who prepares the compiler. ... Step S3 determines a compiler structure in two steps S30 and S31. The step S30 determines the number of times of changing intermediate representations. In principle, this number corresponds to the number of classes of the classified optimization functions. The number may also be determined according to the types of intermediate representations and the intermediate representation dependencies of the optimization functions. The step S31 determines the optimization functions in three steps S310, S311, and S312. The step S312 determines the execution order of the optimization functions according to the front-end and code-providing dependencies of the functions. Once the optimizing structure is determined, the intermediate representation optimizing and changing processes are carried out according to the determined results. Namely, the intermediate representations are changed and optimized phase by phase, to provide codes that form an optimized object program." in column 6, lines 66-68 to column 7, lines 1-6; and column 7, lines 26-51).

Hayashi does not explicitly teach specifying an initial value of each routine variable by calling an initialization routine associated with the source language routine provided by the user; the optimizing change including a change based on a criterion specified by the user; initializing

Art Unit: 2124

the variables to the specified initial value; executing the machine language routine in a computer system having architecture of a target computer system using the initialized values; measuring a characteristic of the execution by calling a measuring routine associated with the source language routine provided by the user; and evaluating whether a stopping criterion after said executing is met based on a result of the measuring and if not, repeating said performing through said measuring, saving the machine language routine having a best measured characteristic, until the stopping criterion is met wherein said characteristic includes at least one of a timing wherein the best measured timing is a lowest timing, a machine language routine size, and a bus utilization metric.

Buzbee teaches specifying an initial value of each routine variable by calling an initialization routine associated with the source language routine provided by the user (column 5, lines 66-67 to column 6, lines 1-3); the optimizing change including a change based on a criterion specified by the user (column 6, lines 12-18); initializing the variables to the specified initial value; executing the machine language routine in a computer system having architecture of a target computer system using the initialized values (“application 53 is run, in a step 55, under a translator ... Table 2 below shows an example of how the source code in Table 1 looks when compiled into object code ... Store 0 in sum” in column 6, lines 4-5 and lines 41-67; Tables 1 and 2; and Fig. 6; for example, the variable sum is initialized to 0, which is the specified initial value).

Granston teaches measuring a characteristic of the execution by calling a measuring routine associated with the source language routine provided by the user; and evaluating whether a stopping criterion after said executing is met based on a result of the measuring and if not,

Art Unit: 2124

repeating said performing through said measuring, saving the machine language routine having a best measured characteristic, until the stopping criterion is met wherein said characteristic includes at least one of a timing wherein the best measured timing is a lowest timing, a machine language routine size, and a bus utilization metric (column 4, lines 34-67).

It would have been obvious to one having ordinary skill in the computer art at the time of the invention was made to modify the method disclosed by Hayashi to include specifying an initial value of each routine variable by calling an initialization routine associated with the source language routine provided by the user; the optimizing change including a change based on a criterion specified by the user; initializing the variables to the specified initial value; executing the machine language routine in a computer system having architecture of a target computer system using the initialized values; measuring a characteristic of the execution by calling a measuring routine associated with the source language routine provided by the user; and evaluating whether a stopping criterion after said executing is met based on a result of the measuring and if not, repeating said performing through said measuring, saving the machine language routine having a best measured characteristic, until the stopping criterion is met wherein said characteristic includes at least one of a timing wherein the best measured timing is a lowest timing, a machine language routine size, and a bus utilization metric using the teaching of the combination of Buzbee and Granston. The modification would be obvious because one of ordinary skill in the art would be motivated to further optimize optimized object code based on run-time profile data and to reduce execution time and code size by optimizing code (Granston, column 1, lines 37-49).

Art Unit: 2124

Per Claim 4:

The rejection of claim 1 is incorporated, and Hayashi further teaches including defining a plurality of segments within the intermediate language routine, each said segment comprising consecutive intermediate language routine statements wherein no segment includes a same intermediate language routine statement, and the performing an optimizing change is performed within one of the segments (column 6, lines 19-22 and column 7, lines 7-51).

Per Claim 5:

The rejection of claim 1 is incorporated, and Hayashi further teaches including determining ordering dependencies in said intermediate language routine wherein said performing an optimizing change includes maintaining the determined ordering dependencies (column 10, lines 34-40).

Per Claim 6:

The rejection of claim 1 is incorporated, and Hayashi further teaches wherein the optimizing change comprises one of a generic optimization, a reordering, a user selectable reordering, a user selectable global reordering, a user selectable insertion of at least one instruction in a selectable position in the intermediate language routine, and a user selectable removal of at least one instruction from a selectable position in the intermediate language routine; wherein each optimizing change does not affect the intermediate language routine integrity (column 8, lines 37-48; column 10, lines 14-43; and Fig. 5).

Art Unit: 2124

Per Claim 7:

The rejection of claim 1 is incorporated, and Buzbee further teaches including after the generating the machine language routine and before the executing the machine language routine, at least one use selectable optimization to the machine language routine (column 5, lines 66-67 to column 6, lines 1-3).

Per Claim 8:

The rejection of claim 1 is incorporated, and the combination of Hayashi and Buzbee further teaches wherein the optimizing changes in a sequence of a plural number of a repeated said performing resulting from the stopping criterion not met is performed according to a process that includes at least one of a non-repeating optimizing change (Hayashi, column 6, lines 41-46), a user selectable optimization change sequence (Buzbee, column 5, lines 66-67 to column 6, lines 1-3); and a parallel search across a plural number of processing units (Hayashi, column 11, lines 61-65).

Per Claim 9:

The rejection of claim 1 is incorporated, and Buzbee further teaches wherein the initializing further includes initializing the position of at least part of said machine language routine in the first computing system memory, and the executing includes executing the machine language using the initialized position (column 4, lines 41-67).

Per Claim 10 (Amended, as best understood):

Art Unit: 2124

This is a machine-readable medium version of the claimed method discussed above, claim 1, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, this claim is also obvious.

Per Claims 13-18 (as best understood):

These are machine-readable medium versions of the claimed method discussed above (claims 4-9, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

Per Claim 19 (as best understood):

The rejection of claim 10 is incorporated, and Buzbee further teaches wherein the operations further include a user interface for reading from the user at least one of the specified values of the routine variables, and optimizing instructions wherein the performing operation includes implementing the optimizing instructions (column 5, lines 66-67 to column 6, lines 1-3).

Per Claim 20 (Amended):

This is an apparatus version of the claimed machine-readable medium discussed above, claim 10, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, this claim is also obvious.

Per Claim 22:

Art Unit: 2124

This is an apparatus version of the claimed machine-readable medium discussed above, claim 17, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, this claim is also obvious.

Per Claims 23 & 25-27:

These are apparatus versions of the claimed machine-readable medium discussed above (claims 10 & 13-15), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

Per Claim 28:

The rejection of claim 20 is incorporated, and Hayashi further teaches wherein the change in the intermediate routine file includes a user selectable optimization (column 15, lines 66-68 to column 16, lines 1-16).

Per Claim 29:

This is an apparatus version of the claimed machine-readable medium discussed above, claim 18, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, this claim is also obvious.

Per Claim 30:

Art Unit: 2124

The rejection of claim 20 is incorporated, and Hayashi further teaches wherein the computing system includes a plurality of processors that each have an architecture of the target computing system (column 11, lines 61-65).

Response to Arguments

12. Applicant's arguments with respect to claims 1, 4-10, 13-20, 22-23 and 25-30 have been considered but are moot in view of the new ground(s) of rejection.

In the remarks, the applicant argues that:

a) In view of the foregoing amendments, it is respectfully submitted that claims 1, 4-10, 13-20, 22-23 and 25-30 include limitations that are not disclosed or suggested by the cited references. Specifically, independent claim 1 as amended recites as follows:

1. A method ...

specifying an initial value of each routine variable by calling an initialization routine associated with the source language routine provided by the user; ...

the optimizing change including a change based on a criterion specified by the user; ...

measuring a characteristic of the execution by calling a measuring routine associated with the source language routine provided by the user; ...

(Emphasis added)

Art Unit: 2124

Independent claim 1 includes reverse communications when optimizing the compiled codes, where the variables of the routine being optimized are initialized by calling an initialization routine associated with the routine being optimized and provided by a user who provides the source code. After the code has been optimized and executed, a measurement is performed by calling a measuring routine associated with the routine being optimized and provided by the user. A result of measurement is used to evaluate whether further iterative operations may be needed until a predetermined stopping criterion has been met. It is respectfully submitted that these limitations are absent from the cited references, individually or in combination.

Rather, Hayashi relates to a conventional compiler that relies on intermediate representation structure data of the compiler (see, Fig. 2, col. 5, line 14 to col. 6, line 52 of Hayashi). There is no communications in Hayashi between the compiler and user provided routines associated with the routine being optimized. All of the optimizations performed by the compiler or optimizer are based on information previously stored in the compiler.

In contrast, independent claim 1 includes runtime communications with the user supplied routine to initialize the variables of the routine being optimized and the measurements of the optimizations are performed by calling the user supplied measurement routine. As a result, the user has more flexibility to specify what to optimize and how to measure the optimization. In order to render a claim obvious, each and every limitation of the claims must be disclosed by the cited references. It is respectfully submitted that Hayashi fails to disclose or suggest these limitations. Similarly, Buzbee and Granston also fail to disclose the limitations set forth above.

In addition, there is no suggestion within the cited references to combine Hayashi, Buzbee, and Granston. Even if they were combined, such a combination still lacks the limitations set forth above. Therefore, for the reasons discussed above, it is respectfully submitted that independent claim 1 is patentable over the cited references.

Similarly, independent claims 10 and 20 include limitations similar to those recited in claim 1. Thus, for the reasons similar to those discussed above, independent claims 10 and 20 are patentable over the cited references.

Given that the rest of the claims depend from one of the above independent claims, at least for the reasons similar to those discussed above, it is respectfully submitted that the rest of the claims are patentable over the cited references. Withdrawal of the rejections is respectfully requested.

Examiner's response:

a) Examiner strongly disagrees with applicant's assertion that the combination of Hayashi, Buzbee, and Granston fails to disclose the claimed limitations recited in claims 1, 4-10, 13-20, 22-23 and 25-30. The combination of Hayashi, Buzbee, and Granston clearly shows each and every limitation in claims 1, 4-10, 13-20, 22-23 and 25-30.

Currently, *Buzbee* is relied upon for teaching specifying an initial value of each routine variable by calling an initialization routine associated with the source language routine provided by the user (column 5, lines 66-67 to column 6, lines 1-3); the optimizing change including a change based on a criterion specified by the user (column 6, lines 12-18); and *Granston* teaches

Art Unit: 2124

measuring a characteristic of the execution by calling a measuring routine associated with the source language routine provided by the user (column 4, lines 34-67).

Furthermore, there is suggestion within the cited references to combine Hayashi, Buzbee, and Granston. That is, the modification would be obvious because one of ordinary skill in the art would be motivated to further optimize optimized object code based on run-time profile data and to reduce execution time and code size by optimizing code (Granston, column 1, lines 37-49).

In addition, see the rejection above in paragraph 11 for rejection to claims 1, 4-10, 13-20, 22-23 and 25-30.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Art Unit: 2124

14. Any inquiry concerning this communication from the examiner should be directed to Qamrun Nahar whose telephone number is (571) 272-3730. The examiner can normally be reached on Mondays through Thursdays from 8:30 AM to 6:00 PM. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki, can be reached on (571) 272-3719. The fax phone number for the organization where this application or processing is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

QN
February 14, 2005

Kakali Chaki

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